

Task Order 18-10

1. Title of Effort: Crew Exploration Vehicle (CEV) Support

2. Task Description:

The contractor shall provide engineering and analytical expertise to the CEV Project.

2.1 SOW Reference: Section C, Subsections 5.0, and 6.0

2.2 Requirements

2.2.1 Management, Administrative, and Program Assurance

- a. Assist in management of cost, schedule, product delivery, and tasks in areas of CEV requiring safety & mission assurance consideration.
- b. Support coordination of CEV SR&QA activities with the Cx SR&QA Office as appropriate.
- c. Provide administrative support to the CEV SR&QA Office.
- d. Support coordination of CEV SR&QA participation in the CEV change process.
- e. Support SR&QA Panel activities including coordination of agendas and action tracking.

2.2.2 System Safety

Provide engineering expertise in the areas of systems safety, through the subsystem level. Evaluate systems engineering solutions to technical issues, provide inputs to hazard analyses, and evaluate and assess risk associated with the Project's approach to designing and operating the CEV architecture.

- a. Identify risks from CEV safety data package/hazard analysis requiring review, assessment, or further analysis by Project technical forums.
- b. Evaluate SR&QA deliverables for compliance with Program/Project requirements.
- c. Identify impacts to program and element hazards or potential new hazards resulting from project activities.
- d. Provide recommendations to Project Boards/Panels regarding safety implications of hardware/software design and operations.
- e. Develop SR&QA requirements for the technical performance of the CEV system with respect to safety and mission assurance.
- f. Identify missing or non-compliant S&MA requirements as well as performance requirements that cannot be verified.
- g. Provide coordination and resolution of changes or issues dealing with Program/Project SR&QA requirements.
- h. Evaluate risks to project success posed by pending Program/Project decisions during DDT&E and report results to the CEV SR&QA Manager.

2.2.2.1 CEV Boards, Panels, Working Groups

- a. Provide technical support to the CEV SR&QA Panel.
- b. Provide technical support to the Cx Safety Engineering Review Panel (CSERP) as required.
- c. Perform/provide qualitative and/or quantitative risk assessments of the baselining of, or changes to, program/project requirements and element interface requirements or specifications.
- d. Identify impacts to documented Hazard and CIL risk mitigation controls posed by changes, waivers, issues, or decisions pending at Program/Project boards, panels, and working groups.
- e. Evaluate qualitative and/or quantitative risk assessments provided by CEV elements/project offices for items that represent an increase in risk to CEV safety and mission success.

2.2.2.2 Hardware Design Evaluation & Review

- a. Evaluate deliverables and assess overall technical risk as part of major Program and project design and flight readiness review milestones. Verify compliance to Program/Project SR&QA technical and programmatic requirements. Develop review item dispositions and/or comments and participate in the resolution of issues related to safety and mission success.

- b. Assure that parts selection and derating criteria are compliant with Program/Project requirements.
- c. Identify potential hazards, evaluate proposed hazard controls, and evaluate methods for verification of hazard controls. Approve CEV Hazard Reports.
- d. Participate in system-level trades studies to identify and evaluate risks with overall objective of reducing or eliminating risks to safety and mission success.

2.2.2.3 CEV Operations Activity

- a. Perform quantitative operational risk assessments for operations associated with ISS and lunar sortie missions.
- b. Work with the operations managers to identify, track and resolve safety issues and concerns associated with CEV flight hardware/software and operations.
- c. Perform/provide qualitative and/or quantitative risk assessments in support of operations boards and panels. Change requests (CR) evaluations are provided to the SR&QA Panel Representatives for each respective board.
- d. Assess hazards associated with joint operations.

2.2.2.4 Problem Assessment

- a. Assess system problem reports to determine risk to CEV safety and mission success.
- b. Assess problems involving the CEV elements to determine impact to flight and provide SR&QA position to program acceptance rationale.
- c. Assure that problems identified by the Program/Project through program and industry problem databases are assessed for CEV impacts and identified to the CEV SR&QA Manager.
- d. Participate in problem resolution teams and approve problem dispositions.

2.2.2.5 Verification Assessment

- a. Assure that verification / validation plans are compliant with Program/Project requirements.
- b. Assure that hazard controls are verified as recorded in the approved Hazard documentation.

2.2.3 Reliability, Maintainability, and Supportability

Provide engineering expertise in the areas of reliability, maintainability and supportability, through the subsystem level, in representing CEV SR&QA at technical forums. In this regard, JSC evaluates systems engineering solutions to technical issues, provides inputs to hazard analyses, Failure Modes and Effects Analysis (FMEA)/Critical Items List (CIL), and evaluates and assesses risk associated with the Project's approach to designing and operating the CEV architecture.

- a. Identify risks from CEV FMEA/CIL effort requiring review, assessment, or further analysis by Project technical forums.
- b. Evaluate SR&QA deliverables for compliance with Program/Project requirements.
- c. Identify impacts to program and element FMEA/CILs or potential failure modes resulting from project activities.
- d. Identify potential critical items list failure modes, causes, effects, methods of verification, and acceptance rationale.
- e. Provide recommendations to Project Boards/Panels regarding reliability implications of hardware design and operations.
- f. Assist in development of SR&QA requirements for the technical performance of the CEV system with respect to safety and mission assurance.
- g. Provide coordination and resolution of changes or issues dealing with Program/Project SR&QA requirements
- h. Evaluate risks to project success posed by pending Program/Project decisions during DDT&E and report results to the CEV SR&QA Manager

2.2.3.1 CEV Boards, Panels, and Working Groups

- a. Provide technical support to the CEV SR&QA Panel.
- b. Provide technical support to the Cx Safety Engineering Review Panel (CSERP).

- c. Perform/provide qualitative and/or quantitative risk assessments of the baselining of, or changes to, program/project requirements and element interface requirements or specifications.
- d. Identify impacts to documented Hazard and CIL risk mitigation controls posed by changes, waivers, issues, or decisions pending at Program/Project boards, panels, and working groups.
- e. Evaluate qualitative and/or quantitative risk assessments provided by CEV elements/project offices for items that represent an increase in risk to CEV safety and mission success.

2.2.3.2 Hardware Design, Evaluation and Review

- a. Evaluate deliverables and assess overall technical risk as part of major Program and project design and flight readiness review milestones. Verify compliance to Program/Project SR&QA technical and programmatic requirements. Develop review item dispositions and/or comments and participate in the resolution of issues related to safety and mission success.
- b. Assure that parts selection and derating criteria are compliant with Program/Project requirements.
- c. Identify potential hazards, evaluate proposed hazard controls, and evaluate methods for verification of hazard controls. Approve CEV Hazard Reports.
- d. Participate in system-level trades studies to identify and evaluate risks with overall objective of reducing or eliminating risks to safety and mission success.

2.2.3.3 Human Rating

- a. Evaluate system compliance to NASA human rating and crew survival requirements. Identify issues and recommend solutions.
- b. Participate in human rating certification activities and provide recommendations to the SR&QA Manager regarding readiness of the system for certification.

2.2.3.4 Problem Assessment

- a. Assess system problem reports to determine risk to CEV safety and mission success.
- b. Assess problems involving the CEV elements to determine impact to flight and provide SR&QA position to program acceptance rationale.
- c. Assure that problems identified by the Program/Project through program and industry problem databases are assessed for CEV impacts and identified to the CEV SR&QA Manager.
- d. Participate in problem resolution teams and approve problem dispositions.

2.2.3.5 Analysis

- a. Work as part of the Probabilistic Risk Assessment (PRA) team to develop assigned portions of the CEV PRA to be integrated into the system- and architecture-level models.
- b. Interface with the appropriate project and prime contractor work force to ensure the collection of failure and operation related data for relevant failure modes and corresponding subsystem success criteria.
- c. Provide system modeling and data analysis expertise to the development of the model and reduction and application of probability data.
- d. Oversee and review all PRA system modeling and analysis performed by the prime contractor.

2.2.4 Software Safety & Assurance

2.2.4.1 Software Design Evaluation & Review

- a. Evaluate software deliverables and assess overall technical risk as part of major Program and element design and flight readiness review milestones. Verify compliance to Program/Project SR&QA technical and programmatic requirements. Develop review item dispositions and/or comments and participate in the resolution of issues related to safety and mission success.
- b. Participate in system-level trades studies to identify and evaluate risks with overall objective of reducing or eliminating risks to safety and mission success.
- c. Identify system certification requirements, evaluate qualification/certification analysis, test plans and procedures and/or test results, and approve software certification.

2.2.4.2 Software Problem Assessment

- a. Assess software problem reports to determine risk to CEV safety and mission success.
- b. Assess software problems involving the CEV elements to determine impact to flight and provide SR&QA position to program acceptance rationale.
- c. Participate in software problem resolution teams and approve problem dispositions.

3.0 PERIOD OF PERFORMANCE: October 1, 2009 – September 30, 2010

4.0 ESTIMATED COSTS:

Contractor may provide travel, training, materials, and other non-labor resources as necessary to support task order requirements.